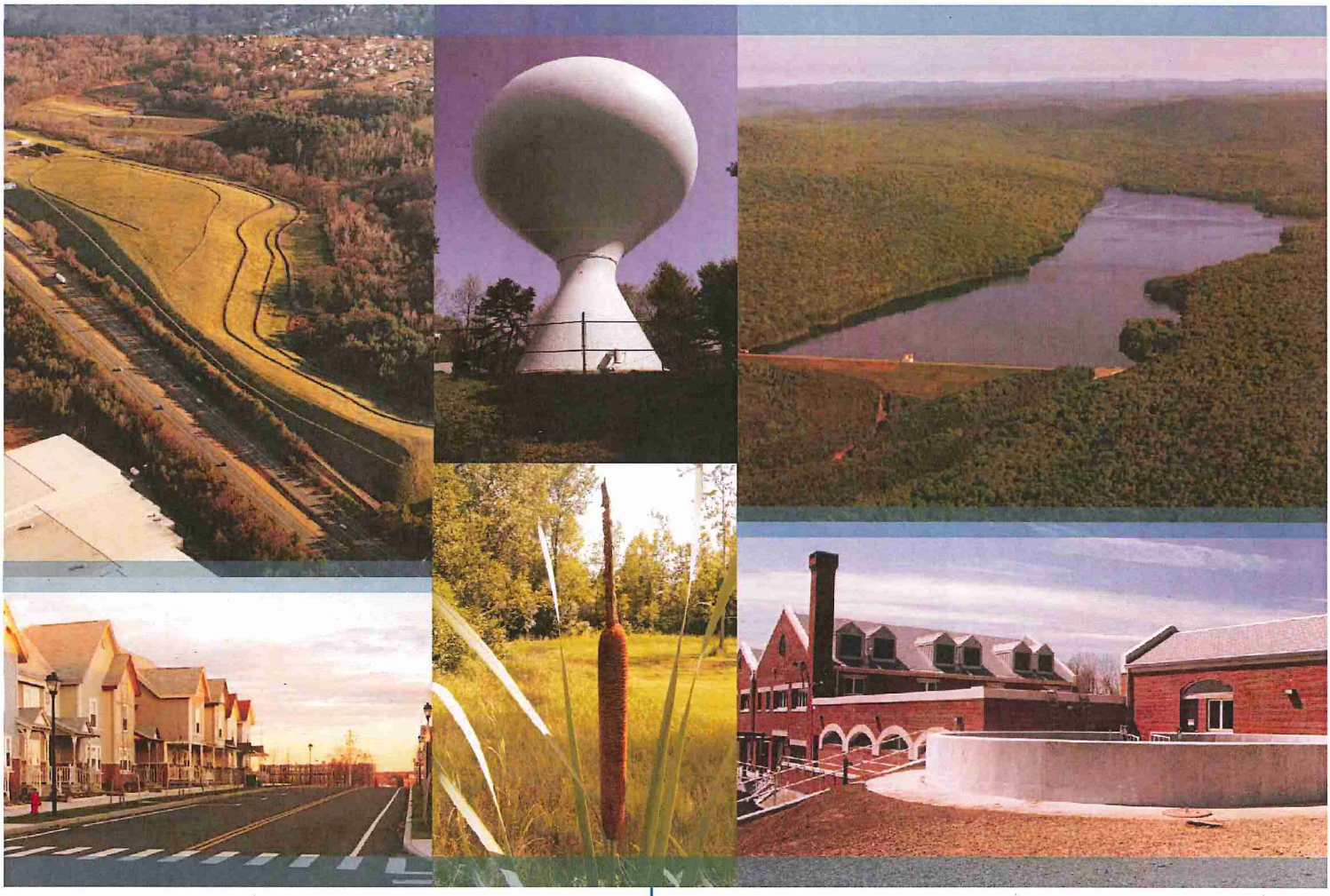


Tighe&Bond

Corbin Block

Sanitary Sewer System Capacity Analysis

Prepared For:
Baywater Corbin Partners, LLC

May 25, 2018

Tighe&Bond
Engineers | Environmental Specialists

11-0509-6
May 16, 2018

Mr. David Genovese
Baywater 10 Corbin, LLC
1019 Boston Post Road
Darien, CT 06820

Re: **Post Road/Corbin Drive Sewer System**
Stonybrook Pump Station
Capacity Analysis

Dear David:

Baywater 10 Corbin, LLC, is proposing the construction of a mixed-used project consisting of residential, office and retail development at the properties bordered by the Boston Post Road (U.S. Route 1) to the west, Corbin Drive to the north, and Interstate 95 to the south (the Site).

Prior to accepting any new sewer connections from the Site, the Darien Sewer Commission has required that a capacity analysis of the gravity mains on the Boston Post Road and Corbin Drive, as well as the Stonybrook pump station be performed to evaluate if adequate capacity exists for the proposed Corbin Drive development, as well as any additional future sewer connections which may take place within the sewershed.

This letter presents the results of our analyses.

This capacity analysis was originally performed in 2015, however, sewer flows have been updated with flows expected from the current development as proposed. Flow metering information, pump run times, and water usage data are all based upon information obtained as part of the 2015 evaluation.

Overview

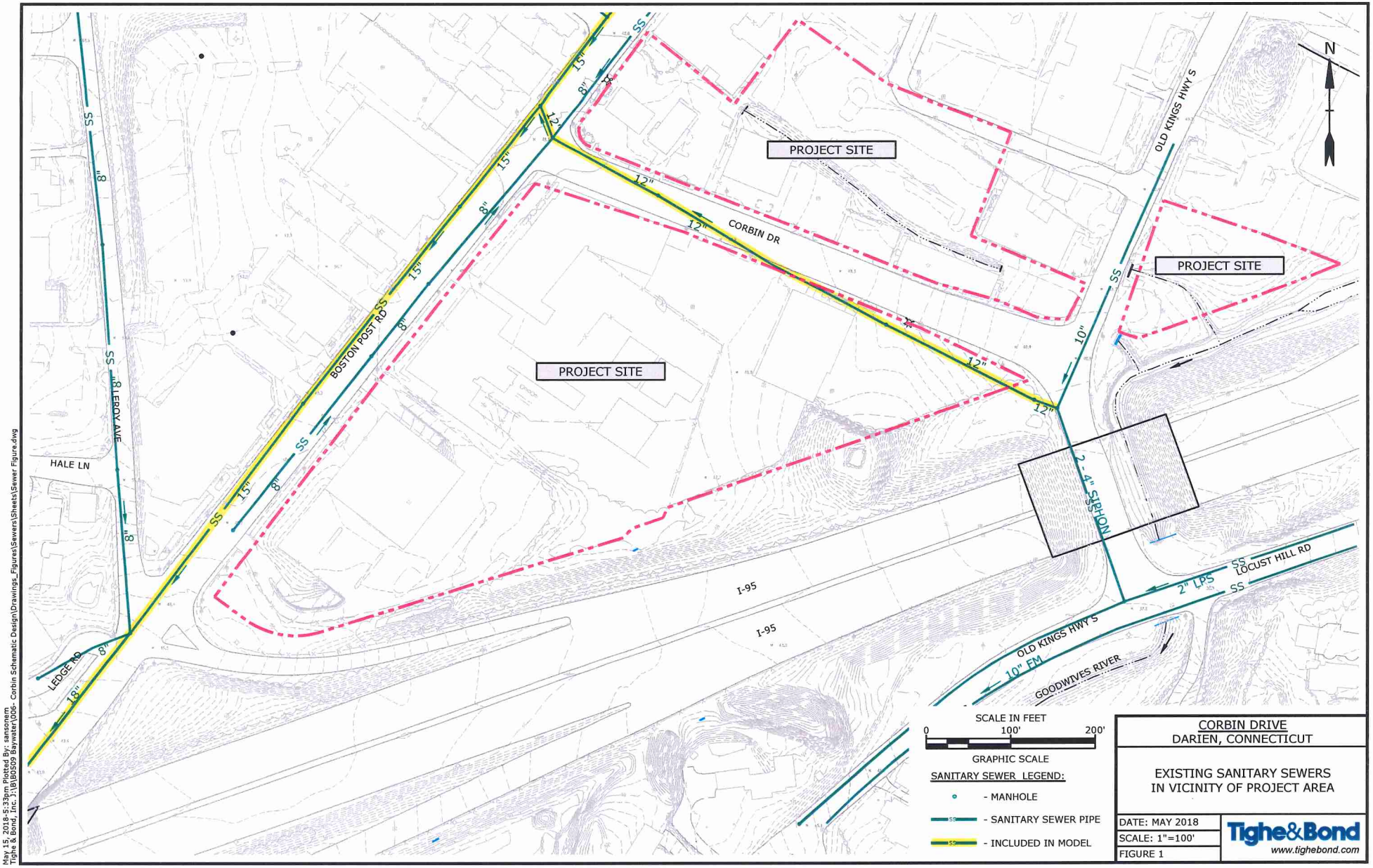
Existing Sewers:

A layout of the existing sewers in the vicinity of the Site is attached as Figure 1. Existing sewer mains include the following:

- An 8" gravity pipe on the south side of the Boston Post Road which flows northeast towards Corbin Drive. This short section of sewer receives flow only from the adjacent site properties.

- A 15" gravity main on the north side of the Boston Post Road which flows southwest towards Leroy Avenue. This gravity main receives flow from a large portion of the Town's system, including all streets north of Interstate 95 and all streets generally east of and including Mansfield Avenue and its side streets.

- A 12" main on Corbin Drive which receives flow from the gravity line on Old Kings Highway South and the Andrews Drive/Brushy Hill Road Area. An 8" line on the east side of the Boston Post Road flows northerly, and connects to the 12" line in Corbin Drive at the Post Road/Corbin Drive intersection. The 12" main then crosses the Post Road and connects to the 15" main on the north side of the Post Road.



May 15, 2018-5:33pm Plotted By: sansonem
Tighe & Bond, Inc. J:\B\B0509 Baywater\006- Corbin Schematic Design\Drawings_Figures\Sewers\Sheets\Sewer Figure.dwg

The 15" gravity sewer main on the north side of the Post Road turns into an 18" pipe at the intersection of Boston Post Road and Leroy Avenue. This line flows south along the Post Road to the Stonybrook pump station. The pipe size remains 18" all the way to the pump station inlet, with the exception of where the trunk line crosses Stony Brook, where dual 12" lines were installed.

Connection from the proposed development site is possible to any of the 3 sewer mains discussed above, or a combination of two or more mains. Specific connection points have not been identified, as they will be dependent upon the finalization of the specific development plan and comments received from the Town.

Pump Station:

The Stonybrook pump station is located on the Boston Post Road just south of its intersection with Renshaw Road. The Stonybrook pump station receives flow from a large section of sewers in the northern and eastern parts of Darien, as well as flow from several smaller pump stations, including Post Road East, Chasmars Pond, Five Mile River Road, West Avenue, Middlesex Common, and Andrews Drive pump stations. A map showing the total service area of the Stonybrook pump station is included as Figure 2.

Sewage enters the station through an 18" influent sewer, passes through two comminutors located in the influent channel into a precast concrete wet well.

The station utilizes three pumps installed in a wet pit/dry pit layout. The original pumps were extended shaft pumps with 75 HP motors. Information on the specific manufacturer/model number was not available. The Town has replaced the original pumps with dry pit submersible pumps. The first pump was installed in June, 2015, with the 2nd and 3rd pumps replaced in 2016 and 2017. The new pumps are Flygt 6" NT3202 pump with 70 HP motors. The operating point of each new pump is 1,950 gpm (2.8 MGD) at a total dynamic head of 100 FT. All 3 pumps at the station operate on variable frequency drives. Therefore, the pump rates vary as needed to match incoming flow requirements.

The design capacity of the station is 3.4 MGD as listed in the report entitled "Stony Brook Sewer Shed Collection System Review" dated July 2005, prepared by Malcolm Pirnie (2005 Report). Design capacity as defined in the document entitled "TR-16: Guides for the Design of Wastewater Treatment Works" published by the New England Interstate Water Pollution Control Commission (TR-16) is the pump discharge rate with one pump out of service. Therefore, the pump station is capable of pumping 3.4 MGD with two pumps running.

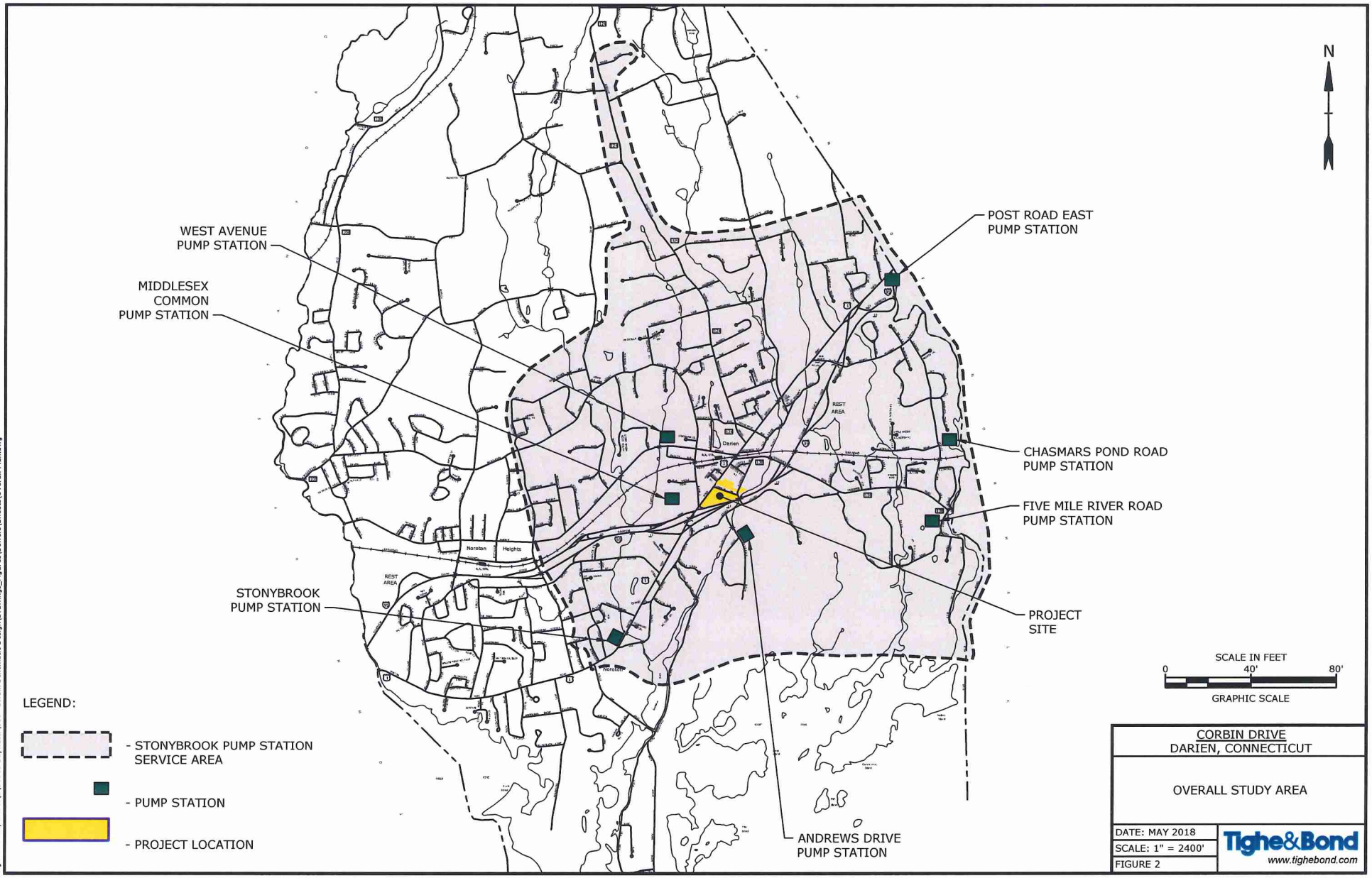
Since the station contains 3 pumps, a pump discharge rate higher than 3.4 MGD is feasible, but the total flow rate increase would not be significant because of the very high dynamic head created by 3 pumps operating at the same time.

Capacity Evaluation Methodology

Stonybrook Pump Station Existing Flows:

Pump flows from the Stonybrook pump station were obtained directly from the Town of Darien's SCADA system. This system is capable of producing hourly and daily totals, as well as instantaneous pump rates at the station.

Total daily flows at the Stonybrook station were noted to vary widely depending upon rain events and groundwater conditions/season. Daily flow totals from July 1st – July 28th, 2015 have all been less than 1.0 MGD. The largest flow noted in 2013/2014/2015 was on May 1,



May 15, 2018-5:33pm Plotted By: aansonern
Tighe & Bond, Inc. J:\B\B0509 Baywater\006- Corbin Schematic Design\Drawings_Figures\Severs\Sheets\Overall Plan.dwg

2014, where the total flow was 3.53 MGD. SCADA records indicated that all 3 pumps were running continuously for the entire day.

Gravity Sewer Flow Metering:

In order to establish baseline flow conditions within the sewers in the vicinity of the Site, continuous flow meters were installed in the 12" sewer main on Corbin Drive, as well as the 15" sewer main on the north side of the Boston Post Road. These meters measured flows within the sewer system for a 4 week period beginning on May 27th and ending on June 24, 2015. A copy of the flow data information is included in Appendix A.

When the flow meters were initially installed on May 27th, it was noted that the Corbin Drive sewer was significantly backed up with grease deposits. The Town of Darien Department of Public Works was contacted to clear the line and allow the meter to be installed.

A review of the flow data shows that the velocity of the sewer in both pipelines is less than 2.0 feet per second for most of the day. This is the minimum design velocity for a gravity line recommended in TR-16. This low velocity combined with a high depth of flow led to meter flow readings that appear to be inflated above what would normally be expected given the downstream flows being recorded at the pump station. It is recommended that the Town investigate this line to determine if there is any type of blockage which could be impeding flows in this section of sewer main.

System Flows:

The number of potential future connections into the existing sewer system was based upon tax map information taken from the Town of Darien website. For the purposes of this evaluation, it was assumed that all properties not currently sewered may eventually connect into the sewer system. Review of this data revealed that a total of 2,370 residential and commercial customers are currently connected to the Town sewer within the Stonybrook pump station service area, and there are 384 possible future connections.

Existing Flows:

Existing sewer flow information was based upon water use data provided by the Darien Department of Public Works. The average water use of all residential customers was calculated to be 312 gpd/customer. This value was applied to all residential connections. Sewer flow information for all commercial accounts was based upon the actual water use for each specific property.

A summary of estimated existing Flows to the pump station based upon water usage is presented below:

Residential Connections: 2,162 @ 312 gpd/house	= 674,500 gpd
208 Commercial Connections: actual use	= 209,500 gpd*
Total:	= 884,000 gpd

* Average commercial water usage = 209,500 gpd/208 customers = 1,007 gpd/customer

In order to determine the accuracy of this method of flow calculations, the Darien SCADA system was accessed to obtain station flows during the month of July. This summer time period minimizes the impact of infiltration and inflow (I/I) on station flows, since I/I is much less prevalent during the summer months as opposed to the spring season when groundwater levels are higher.

The daily flow readings showed that the average total daily flow at the Stonybrook pump station from July 1st to July 29th was 885,491 gpd. This value is very close to the 884,000 gpd flow calculated using water usage. Thus, the water usage methodology appears to be a valid method for estimating sewer flows for this evaluation.

Future Flows:

The average residential water use of 312 gpd/lot was added into the sewer model for all unsewered residential connections. Commercial customers were assigned an average daily flow rate equal to the Town-wide average flows for existing commercial customers of 1,007 gpd.

Using this methodology, future flows to the Stonybrook pump station are estimated to be as follows:

Existing flows:	884,000 gpd
Future Residential: 368 connections @ 312 gpd/house	114,800 gpd
Future Commercial: 16 connections @ 1,007 gpd/lot	16,100 gpd
Total Flows	1,014,900 gpd

Expected Sewer Flows from Proposed Development:

Existing flows were determined to be the water usage from all properties within the Corbin Drive site, or 5,341 gpd.

The proposed development contains a mix of residential, commercial and retail developments, and restaurants. Residential units include 30 - 1 bedroom units and 87 – 2 bedroom units.

Future flows from the proposed development were based upon an assumed sewer flow of 150 gpd/bedroom for all residential units, 0.1 gpd/sf for office and retail space, and 15 square feet/seat with 50% of total space being used for seating at the proposed restaurant. A summary of existing and future sewer flows based on a preliminary development proposal are presented below:

Existing Flows: actual water use	= 5,341 gpd
Residential Connections: 204 BR @ 150 gpd/BR	= 30,600 gpd
Office Space: 81,200 sf @0.1 gpd/sf	= 8,120 gpd
Retail Space: 81,730 sf @ 0.1 gpd/sf	= 8,173 gpd
Restaurants: 16,910 sf @ 20 gpd/sf, 15 sf/seat*	= 11,262 gpd
Total:	= 58,155 gpd
Net Increase from Site:	= 52,814 gpd

*Restaurant flows also assume 50% of total space is used for seating

Adding in the net increase in flows from the proposed development to possible future flows creates a total future flow to the Stonybrook pump station of 1,067,754 gpd.

Pump Station Peak Flows:

In order to fully evaluate the sewer system and pump station capacity, peak flow conditions must be taken into consideration. There are several areas of the gravity sewer system which have been known to flood during rainfall events. These include the sewer mains in the vicinity of the pump station, as well as gravity sewers upstream of the 15" Boston Post Road sewer on Mechanics Street and Old Kings Highway North.

The design capacity of the Stonybrook pump station is 3.4 MGD, however, this flow value has been exceeded on several occasions. For the purposes of this evaluation, the gravity mains were evaluated on the total daily flow reading of 3.53 MGD recorded at the Stonybrook pump station on May 1, 2014.

A review of the pump hour meter readings for May 1, 2014 at the Five Mile River Road station indicate that the Five Mile River Road pump station pumped 4 times more flow than on an average dry day. Estimated flow inputs for the sewer model were therefore multiplied by 4 to determine an overall peak flow rate. The resulting estimated peak flow for the 15" Boston Post Road sewer main at the Corbin Drive intersection was 1.9 MGD. This matches the peak flow of 1.9 MGD noted during the metering conducted as part of the 2005 Malcolm Pirnie report, which helps to confirm the validity of this method of flow distribution.

Pump hour meter readings at the Middlesex Commons pump station indicated a pump run time of 1.2 hours on May 1, 2014. Assuming a conservative pump rate of 100 gpm, the resulting daily flow is lower than the water usage reading. Therefore, no changes were made for this connection. In addition, two service areas (the 8" Boston Post Road sewer section and the 8" connection to the Stonybrook pump station from the west) were multiplied by a value of 2 due to their small size, as the impact of infiltration and inflow within these sections would be negligible compared to the other model connection points.

Summing up all flow input values resulted in a total theoretical peak flow of 3.59 MGD, which is very close to the recorded peak recorded flow of 3.53 MGD from May 1, 2014.

Sewer Capacity Evaluation:

Tighe & Bond developed a model of the existing sewer system using SewerGems software. Data used in the model development was largely based upon the flow calculations discussed above. Additional design assumptions are as follows:

- The area modeled included the 18" trunk line from the Stonybrook pump station, north along the Post Road to the intersection of Post Road and Corbin Drive. The 12" sewer main on Corbin Drive was also included in the model analysis. A layout of the sewer sections included in the final model is presented in Figure 3.

- Sewer main size, slope, and length between manholes for the sewers included in the model was based upon record drawing information obtained from the Darien Public Works Department (DPW).

- Sewer capacity was calculated using the Mannings equation. For this study, a Mannings "N" value of 0.013 was assumed for all pipe sections.

- Flow data inputs were calculated at key locations, including the existing 15" sewer main, Corbin Drive sewer main, and all inlet sewer mains which connect to the Stonybrook pump station.

Model Scenarios:

The SewerGEMS model was used to evaluate the capacity of the sewer system under 8 different flow scenarios, defined as follows:

Scenario Number	Flow Condition	Total Flow (gpd)
1	Existing flow conditions, no site development	884,000
1A	Existing flow conditions, Site development as currently proposed	936,400
2	Future flow conditions, no site development	1,014,950
2A	Future flow conditions, Site development as currently proposed	1,067,350
3	Peak Flow condition of 3.59 MGD, existing flows, no site development	3,597,500
3A	Peak Flow condition of 3.59 MGD, existing flows, site development as currently proposed	3,649,350
3B	Peak flow of 3.59 MGD, future flows, no site development	3,727,900
3C	Peak flow of 3.59 MGD, future flows, Site development as currently proposed	3,780,300

Results

Sewer Capacity:

The SewerGems program calculated the capacity and the expected sewer flows within each segment being evaluated. The results of the SewerGems analysis are presented in the data table included in Appendix B. This table presents information for each sewer segment in the Post Road from Corbin Drive downstream to the Stonybrook pump station. The results for each scenario are discussed individually below:

Scenarios 1, 1A (Existing Conditions): All sewer sections have adequate capacity to handle expected flows. The additional flows from development at the Site as proposed have no impact in flow level in this 8" sewer, as indicated below.

Segment Number	Pipe Size	Hydraulic Grade Line (Flow Level) Scenario 1	Hydraulic Grade Line (Flow Level) Scenario 1A
C-40	8"	6.14	6.14

Scenarios 2, 2A (Future Flows): All sewer sections have adequate capacity to handle expected flows. However, the 8" sewer section which enters the Stonybrook pump station from the west is surcharged due to the volume of flow within the 18" sewer main that is entering the pump station. The additional flows from development at the Site as proposed have no impact in flow level in this 8" sewer, as indicated below.

Segment Number	Pipe Size	Hydraulic Grade Line (Flow Level) Scenario 2	Hydraulic Grade Line (Flow Level) Scenario 2A
C-40	8"	6.16	6.16

Scenarios 3, 3A (Peak Flows, Existing): Several sewer mains become surcharged under peak existing flow conditions, as follows:

- Incoming 8" sewers from the west and south are surcharged due to the volume of flow within the 18" sewer main that is entering the Stonybrook pump station. Additional flows from the proposed development at the Site were noted to have negligible impact on the flow levels in one section of 8" sewer main.
- The double barrel 12" main which crosses Stonybrook is surcharged. The depth flow increases by 0.07 feet when additional flows from the proposed development are taken into consideration.
- One section of 18" pipe upstream of the 12" double line, and 3 sections of 18" pipe downstream from this segment are also noted to be surcharged. Additional flows from the proposed development have negligible impacts on the amount of surcharging in these sections, raising the flow level from 0.01 – 0.08 feet as shown in the summary table below.
- The 15" sewer sections in the Boston Post Road near the intersection with Corbin Drive, as well as the 12" section of sewer which crosses the Post Road in this area become surcharged under peak flows.

Segment Number	Pipe Size	Hydraulic Grade Line (Flow Level) Scenario 3	Hydraulic Grade Line (Flow Level) Scenario 3A
CO-3	8"	7.98	7.98
CO-40	8"	6.42	6.43
CO-8	18"	7.10	7.13
CO-9	18"	7.66	7.74
CO-10	18"	7.68	7.76
CO-11	Dual 12"	7.70	7.77
CO-12	18"	9.06	9.07
CO-29	15"	34.74	34.77
CO-30	15"	34.96	34.98
CO-31	15"	35.22	35.13
CO-32	12"	34.96	34.98

Scenarios 3B, 3C (Peak Flows, Future): The added flow expected under future flow conditions impacts the same sewer sections listed under Scenarios 3 and 3A. A summary of the impacts is presented below:

- Incoming 8" sewers from the west and south are surcharged due to the volume of flow within the 18" sewer main that is entering the pump station. Additional flows

from the proposed development at the Site were noted to have negligible impact on the flow levels in one section of 8" sewer main.

- The double barrel 12" main which crosses Stonybrook is surcharged, as is 1 section of 18" pipe upstream, and 3 sections of 18" pipe downstream from this pipeline.
- Additional flows from the proposed development at the Site have negligible impact on flow levels in the 8" lines and surcharged 18" mains, raising the flow level from 0.01 – 0.08 feet as shown in the summary table.
- The 15" sewer sections in the Boston Post Road near the intersection with Corbin Drive, as well as the 12" section of sewer which crosses the Post Road in this area become surcharged under peak flows.

Segment Number	Pipe Size	Hydraulic Grade Line (Flow Level) Scenario 3B	Hydraulic Grade Line (Flow Level) Scenario 3C
CO-3	8"	7.98	7.98
CO-40	8"	6.45	6.46
CO-8	18"	6.87	6.88
CO-9	18"	7.19	7.23
CO-10	18"	7.86	7.94
CO-11	Dual 12"	7.88	7.96
CO-12	18"	9.08	9.09
CO-29	15"	34.81	34.85
CO-30	15"	35.04	35.10
C0-31	15"	35.23	35.25
C0-32	12"	35.04	35.10

Pump Station Capacity:

The Stonybrook pump station is capable of pumping incoming flows under a large majority of seasonal/weather conditions. Average daily flows are typically less than 1.0 MGD, which is well below the station's rated capacity of 3.4 MGD. Given that the small amount of additional flow from the proposed development site is less than 4% of flow on a typical dry day, it is easy to conclude that adequate capacity exists at the pump station.

However, peak flows have been known to exceed the station's design capacity, causing backups within the gravity sewer system. Infiltration and inflow are a known problem within the Town's sewer system. The Sewer Commission has made several attempts to identify sources of excess flow, and a significant amount of sewer rehabilitation was performed in the 1980s and 1990s to try and eliminate these flows. Unfortunately, the problem still exists.

The volume of infiltration and inflow entering the Town of Darien sewer system takes valuable capacity away from potential users. Certain areas of the collection system exhibit surcharging, backups, and overflowing during extreme weather events. This fact will not change under future flow conditions unless the Town is successful in finding and removing a significant amount of flow.

Conclusions

This report has shown that there is adequate capacity at the pump station and within the sewer system during normal weather conditions. The impacts of the proposed development

on the collection system during extreme peak flow events is insignificant when evaluating flow levels.

We conclude that the addition of the wastewater flow from the proposed Corbin Drive site will not adversely impact the Darien sewer system.

The proposed mixed-use project will be designed by a master architect with quality materials and include open space with plazas while increasing the grand list and generating more tax revenue for the Town.

If you have any questions, please do not hesitate to call.

Very truly yours,

TIGHE & BOND, INC.

Lori A. Carriero, P.E.
Project Manager

John W. Block, P.E, L.S.
Senior Vice President

Enclosures: Appendix A: Flow Monitoring Report
Appendix B: SewerGems Computer Model

J:\B\B0509 Baywater\000-Corbin Drive Inactive\REPORT\Sewer Capacity\2018_05_16 Sewer Capacity.docx

Tighe&Bond

APPENDIX A

EST
Associates, Inc.

Environmental Monitoring
Pipeline Services
Operations & Maintenance

FLOW MONITORING REPORT

for

DARIEN, CT

Prepared for:

Tighe & Bond
1000 Bridgeport Avenue, Suite 320
Shelton, CT 06484

Prepared by:

EST Associates, Inc.
51 Fremont Street
Needham, MA 02494

May-June 2015

EST
Associates, Inc.

SITE INVESTIGATION FORM

Project: Darien, CT **Technician:** MK/CD

SITE LOCATION

37 Busy Bee Prop

Carbin Drive

Side walk

30 Post Office

SMH-2

Location: Parking Lot 30 Carbin Dr. Darien CT

MH# SMH-2

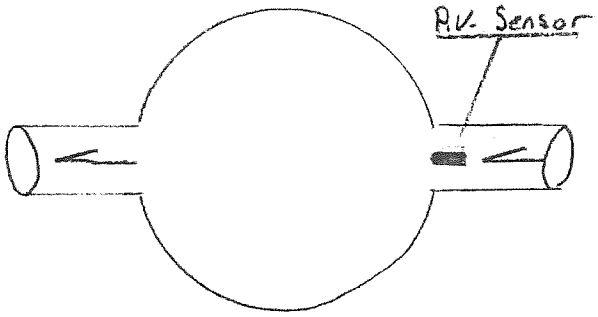
Map #

Date: 5-27-15

Time: 0235

Regulator#

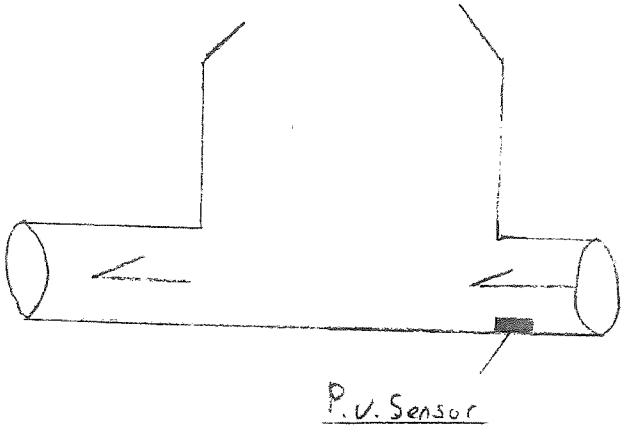
PLAN VIEW



LINE DESCRIPTIONS

	Incoming	Outgoing	Overflow
Size	11.75	11.75	
Material	Lined	Lined	
Debris			
Shape	Round	Round	
Depth	11'8"	11'9"	

PROFILE VIEW



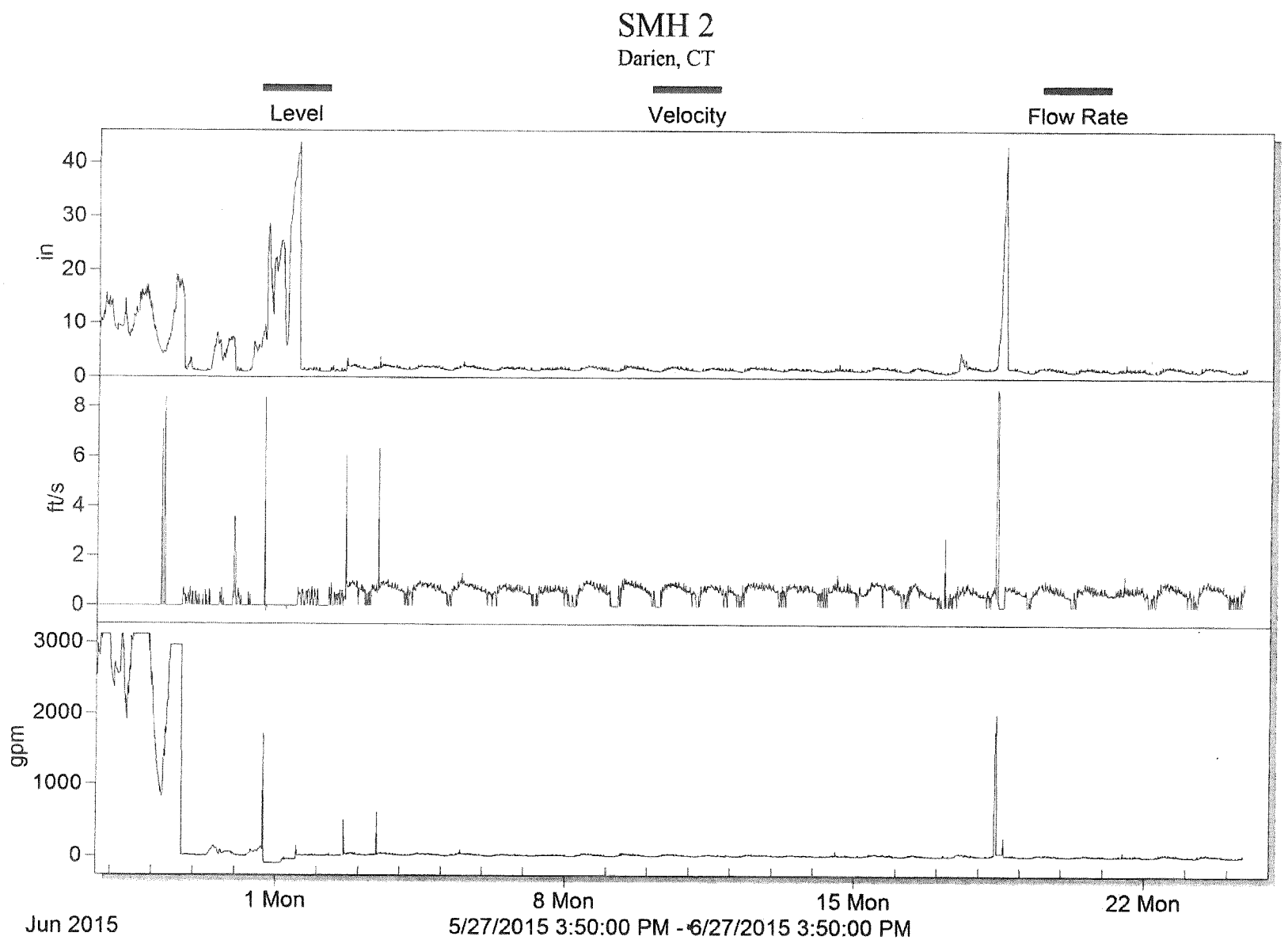
WEIR/FLUME

Length

Width

	Yes	No
Level		
Height Above Weir		
Overflow Occurs @		

51 Fremont Street Needham MA, 02494
tel: 781-455-0003 fax: 781-455-8336


SMH 2
Darien, CT
Level
Velocity
Flow Rate
in
40
30
20
10
0
ft/s
8
6
4
2
0
gpm
3000
2000
1000
0
1 Mon
8 Mon
15 Mon
22 Mon
Jun 2015
5/27/2015 3:50:00 PM - 6/27/2015 3:50:00 PM

EST
Associates, Inc.

FLOW MONITORING

DATE: 5-27-16
TIME: 0324

INSPECTORS' INITIALS: AK/LD

SITE NAME: SMH-2
ADDRESS: 30 Carbin Dr

METER SERIAL NUMBER: EST 127

SERVICES/ACTIONS PERFORMED:

- [x] Sensor Cleaning
- [x] Calibration Check
- [ ] Data Downloaded
- [x] Other Meter Install

Data Downloaded? (Y / N)

- [ ] By Modem: [date:_____]
- [ ] To DTU: [file number:_____]
- [x] To Laptop (Y / N) [SN: 3]

Replace Batteries? (Y / N)

Existing volts: 10.3
New volts: 12.1

Dessicant Status: Good

Replaced dessicant? (Y / N)

METER READINGS

Level Readings Actual 7.5 (in) Metered: 7.415 (in) Recalibrated to:_____(in)

Velocity Readings Actual 0 (ft/s) Metered: * (ft/s)

Errors recorded: [illegible]

Work to be performed/Additional Comments/Observations:

EST
Associates, Inc.

FLOW MONITORING

DATE: 1-10-15
TIME: 1030

INSPECTORS' INITIALS: MK/CD

SITE NAME: SMH-2
ADDRESS: Larkin Dr

METER SERIAL NUMBER: EST 127

SERVICES/ACTIONS PERFORMED:

- ☑ Sensor Cleaning
- ☑ Calibration Check
- ☐ Data Downloaded
- ☐ Other _____

Data Downloaded? (Y / N)

- ☐ By Modem: [date:_____]
- ☐ To DTU: [file number:_____]
- ☐ To Laptop (Y / N) [SN: 42]

Replace Batteries? (Y / N)

Existing volts:_____
New volts: 8.30

Dessicant Status: Good

Replaced dessicant? (Y / N)

METER READINGS

Level Readings Actual 1.75 (in) Metered: 1.760 (in) Recallbrated to:_____(in)

Velocity Readings Actual .8 (ft/s) Metered: .747 (ft/s)

Errors recorded: _____

Work to be performed/Additional Comments/Observations: _____

EST
Associates, Inc.

FLOW MONITORING

DATE: 6-24-15
TIME: 09:15

INSPECTORS' INITIALS: AK/CD

SITE NAME: S.M.H. 2
ADDRESS: 30 Carbin Dr

METER SERIAL NUMBER: EST 127

SERVICES/ACTIONS PERFORMED:

- ☑ Sensor Cleaning
- ☑ Calibration Check
- ☑ Data Downloaded
- ☐ Other Meter Removal

Data Downloaded? (Y / N)

- ☐ By Modem: [date:_____]
- ☐ To DTU: [file number:_____]
- ☑ To Laptop (Y / N) [SN: #2]

Replace Batteries? (Y / N)

Existing volts: 11.78
New volts:_____

Dessicant Status: Good

Replaced dessicant? (Y / N)

METER READINGS

Level Readings Actual 1.75 (in) Metered: 1.735 (in) Recalibrated to:_____(in)

Velocity Readings Actual .8 (ft/s) Metered: .853 (ft/s)

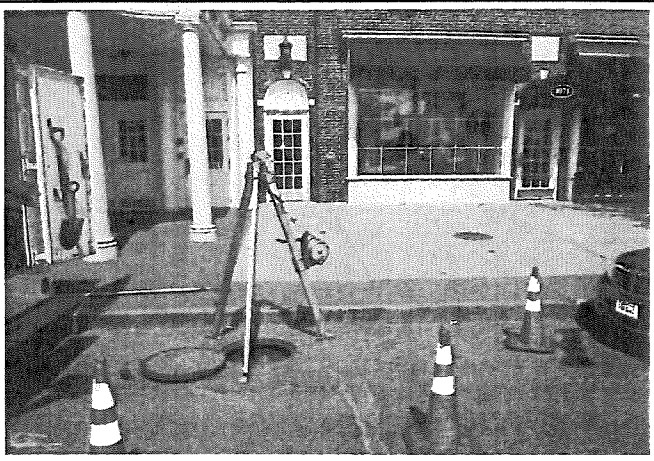
Errors recorded:_____

Work to be performed/Additional Comments/Observations:_____

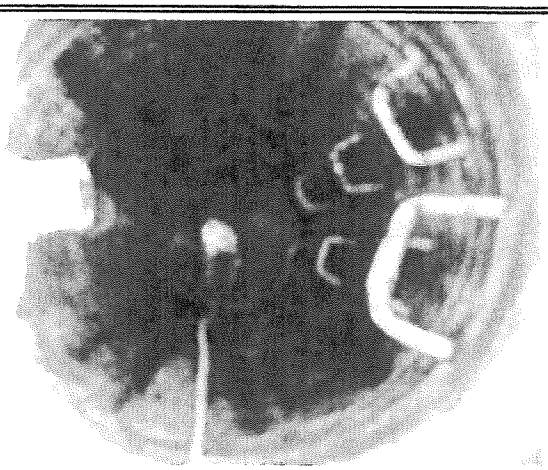
EST
Associates, Inc.

PHOTOS TAKEN: 4-25-14

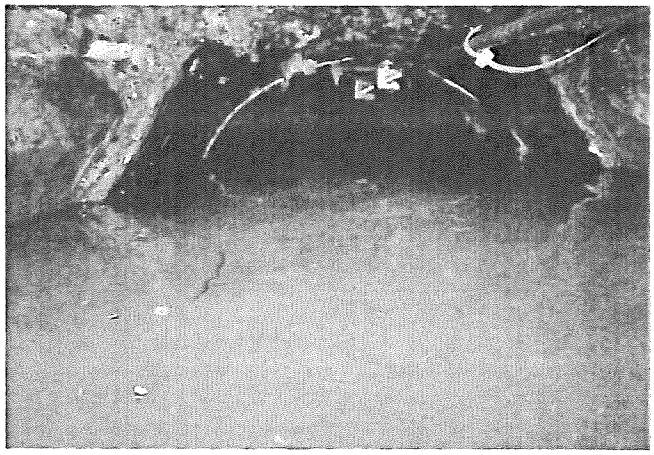
Tighe and Bond: Darien CT SM-62



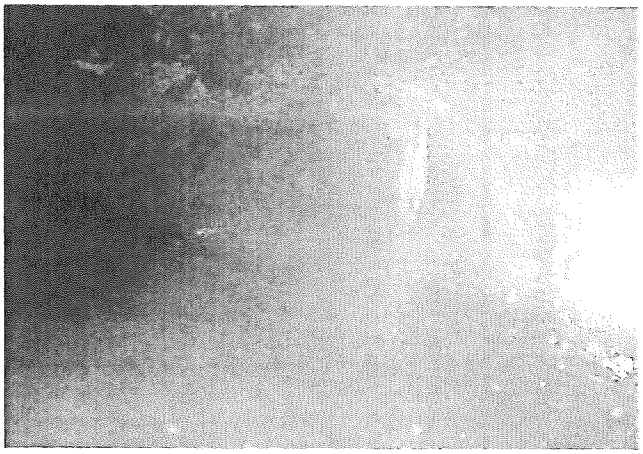
Street View



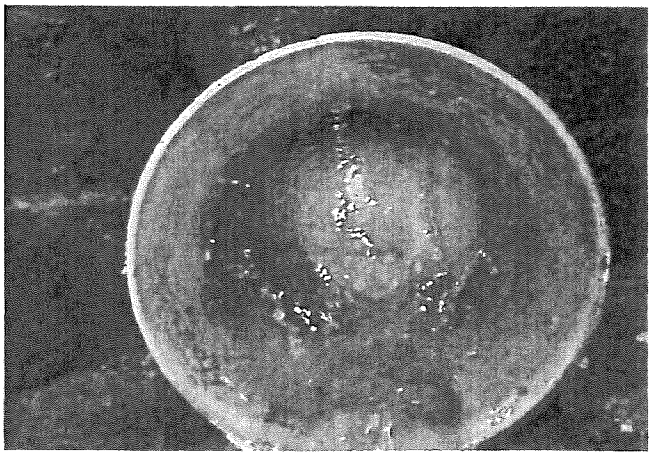
Top View



Upstream



Downstream



Service

51 Fremont Street Needham MA, 02494
tel: 781-455-0003 fax: 781-455-8336

Tighe & Bond - SMH 62, Darien, CT

Daily Flow Rate Table

Date/Time	Average Flow Rate (gpm)	Minimum Flow Rate (gpm)	Time of Minimum Flow Rate	Maximum Flow Rate (gpm)	Time of Maximum Flow Rate	Total Flow (gal)
5/27/2015	303.8	0.0	11:00:00 AM	713.5	2:00:00 PM	437,496
5/28/2015	511.8	264.0	4:30:00 AM	710.5	8:30:00 AM	736,982
5/29/2015	507.0	245.6	3:45:00 AM	719.2	10:00:00 AM	730,140
5/30/2015	495.2	249.8	4:30:00 AM	728.5	10:00:00 AM	713,122
5/31/2015	559.8	224.7	5:00:00 AM	1,003.1	7:00:00 PM	806,115
6/1/2015	752.8	406.6	4:30:00 AM	1,147.5	12:00:00 PM	1,083,980
6/2/2015	783.5	447.8	4:00:00 AM	1,097.2	4:00:00 PM	1,128,300
6/3/2015	799.5	505.8	4:15:00 AM	1,134.2	11:45:00 AM	1,151,270
6/4/2015	732.2	429.0	5:30:00 AM	967.2	8:00:00 AM	1,054,410
6/5/2015	715.3	415.1	4:45:00 AM	1,097.2	10:45:00 AM	1,030,100
6/6/2015	678.1	405.8	4:30:00 AM	968.3	11:15:00 AM	976,436
6/7/2015	634.7	380.3	4:45:00 AM	858.9	12:45:00 PM	913,956
6/8/2015	648.6	332.0	4:45:00 AM	885.5	1:45:00 PM	933,974
6/9/2015	647.7	369.9	3:15:00 AM	893.9	12:15:00 PM	932,638
6/10/2015	626.8	343.6	4:30:00 AM	815.0	8:00:00 AM	902,539
6/11/2015	617.8	340.0	5:15:00 AM	867.0	11:15:00 AM	889,659
6/12/2015	589.3	313.9	4:45:00 AM	788.3	12:00:00 PM	848,663
6/13/2015	576.2	310.2	5:00:00 AM	827.5	10:45:00 AM	829,660
6/14/2015	542.8	302.2	5:00:00 AM	773.0	10:45:00 AM	781,603
6/15/2015	613.4	312.1	2:15:00 AM	874.8	9:30:00 AM	883,263
6/16/2015	587.2	328.7	4:45:00 AM	783.8	9:15:00 AM	845,608
6/17/2015	560.9	311.6	5:15:00 AM	816.6	12:45:00 PM	807,660
6/18/2015	546.5	295.7	3:15:00 AM	982.8	2:45:00 PM	786,904
6/19/2015	555.0	293.7	5:00:00 AM	809.5	11:30:00 AM	799,266
6/20/2015	543.1	292.2	5:30:00 AM	780.0	12:45:00 PM	782,122
6/21/2015	574.4	323.1	3:15:00 AM	864.9	11:15:00 AM	827,202
6/22/2015	553.5	317.0	4:15:00 AM	785.6	10:00:00 AM	797,014
6/23/2015	539.7	277.2	3:15:00 AM	742.6	9:15:00 AM	777,196
6/24/2015	446.7	296.3	5:00:00 AM	704.2	10:15:00 AM	281,410

Flow Total:	Average Flow Rate	Minimum Flow Rate	0.0	Time of Minimum Flow Rate	Maximum Flow Rate	Time of Maximum Flow Rate	Average Total Flow
24,468,700 gal	594.6 gpm	(gpm)		5/27/2015 11:00:00 AM	1,147.5 (gpm)	6/1/2015 12:00:00 PM	843,748 gal

EST
Associates, Inc.

FLOW MONITORING

DATE: 6-3-15
TIME: 1000

INSPECTORS' INITIALS: MK/LD

SITE NAME: SMH-62
ADDRESS: 1071 Boston Post Rd

METER SERIAL NUMBER: EST 128

SERVICES/ACTIONS PERFORMED:

- ☑ Sensor Cleaning
- ☑ Calibration Check
- ☑ Data Downloaded
- ☐ Other _____

Data Downloaded? (Y / N)

- ☐ By Modem: [date:_____]
- ☐ To DTU: [file number:_____]
- ☑ To Laptop (Y / N) [SN: 33]

Replace Batteries? (Y / N)

Existing volts: 11.8
New volts:_____

Dessicant Status: Good

Replaced dessicant? (Y / N)

METER READINGS

Level Readings Actual 13.5 (in) Metered: 13.621 (in) Recalibrated to:_____(in)

Velocity Readings Actual_____(ft/s) Metered: 1.958 (ft/s)

Errors recorded: _____

Work to be performed/Additional Comments/Observations: _____

EST
Associates, Inc.

FLOW MONITORING

DATE: 6-24-14
TIME: 1036

INSPECTORS' INITIALS: MK/CD

SITE NAME: SMH-62
ADDRESS: 1071 Boston Post Rd

METER SERIAL NUMBER: EST 128

SERVICES/ACTIONS PERFORMED:

- ☑ Sensor Cleaning
- ☑ Calibration Check
- ☑ Data Downloaded
- ☑ Other Meter Removal

Data Downloaded? (Y / N)

- ☐ By Modem: [date:_____]
- ☐ To DTU: [file number:_____]
- ☑ To Laptop (Y / N) [SN: # 2]

Replace Batteries? (Y / N)

Existing volts: 11.9
New volts:_____

Dessicant Status: Good

Replaced dessicant? (Y / N)

METER READINGS

Level Readings Actual 11.25 (in) Metered: 11.377 (in) Recalibrated to:_____(in)

Velocity Readings Actual 1.5 (ft/s) Metered: 1.48 (ft/s)

Errors recorded:

Work to be performed/Additional Comments/Observations:

Tighe&Bond

APPENDIX B

SewerGEMS Model Results

Section ID	From MH	To MH	Inv. Start	Inv. Stop	Size	Length	Slope	Maximum Flow Scenario 1: Existing Conditions (No Site)	Maximum Flow Scenario 1A: Existing Conditions (With Site)	Maximum Flow Scenario 2: Future Conditions (No Site)	Maximum Flow Scenario 2A: Future Conditions (With Site)	Maximum Flow Scenario 3: Peak Flow, Existing Conditions (No Site)	Maximum Flow Scenario 3A: Peak Flow, Existing Conditions with (With Site)	Maximum Flow Scenario 3B: Peak Flow, Future Conditions (No Site)	Maximum Flow Scenario 3C: Peak Flow, Future Conditions (With Site)
Boston Post Road Trunk Line															
CO-1	MH-040	O-1	5.27	5	18	10	0.027	1,326,202	1,405,423	1,522,609	1,605,570	3,599,834	3,679,040	3,796,218	3,872,771
CO-2	MH-00	MH-040	5.32	5.27	18	40	0.001	1,284,082	1,363,303	1,480,021	1,560,973	3,487,513	3,566,720	3,683,429	3,759,983
CO-7	MH-095	MH-00	5.43	5.32	18	95	0.001	1,263,400	1,342,621	1,454,553	1,533,884	3,459,935	3,539,144	3,651,063	3,727,620
CO-8	MH-317	MH-095	5.58	5.43	18	222	0.001	1,263,400	1,342,621	1,454,553	1,533,760	3,459,925	3,539,144	3,651,044	3,727,620
CO-9	MH-592	MH-317	5.77	5.58	18	275	0.001	1,263,400	1,342,621	1,454,553	1,533,760	3,459,902	3,539,144	3,651,032	3,727,620
CO-10	MH-646	MH-592	5.83	5.77	18	54	0.001	1,263,400	1,342,621	1,454,553	1,533,760	3,459,897	3,539,144	3,651,027	3,727,620
CO-11	MH-030	MH-646	5.95	5.83	12	30	0.004	975,709	1,054,930	1,126,040	1,205,247	2,690,348	2,743,205	2,790,603	2,843,372
CO-12	MH-330	MH-030	8.35	5.95	18	300	0.008	975,797	1,054,930	1,126,040	1,205,247	2,692,734	2,772,277	2,843,051	2,919,931
CO-13	MH-625	MH-330	13.05	8.35	18	295.7	0.016	977,331	1,054,930	1,127,002	1,205,247	2,693,219	2,772,277	2,840,672	2,919,929
CO-14	MH-238	MH-625	13.34	13.05	18	238	0.001	803,117	882,309	871,519	950,726	2,041,083	2,120,390	2,109,507	2,186,141
CO-39	MH-569	MH-238	14.6	13.34	18	331	0.004	803,088	882,309	871,518	950,727	2,041,082	2,120,389	2,109,700	2,186,141
CO-17	MH-900	MH-569	17.11	14.6	18	331	0.008	803,092	882,308	871,518	950,726	2,039,923	2,120,389	2,111,033	2,186,142
CO-18	MH-1090	MH-900	17.49	17.11	18	190	0.002	803,089	882,308	871,518	950,726	2,041,010	2,120,389	2,109,777	2,186,142
CO-19	MH-1400	MH-1090	17.87	17.49	18	310	0.001	803,090	882,309	871,518	950,726	2,041,182	2,120,390	2,109,593	2,186,141
CO-20	MH-1750	MH-1400	18.29	17.87	18	350	0.001	803,090	882,307	871,520	950,725	2,041,183	2,120,390	2,109,593	2,186,141
CO-21	MH-2081	MH-1750	18.69	18.29	18	331	0.001	803,091	882,308	871,521	950,725	2,041,176	2,120,390	2,109,600	2,186,141
CO-22	MH-2303	MH-2081	20.4	18.69	18	222	0.008	803,089	882,307	871,519	950,726	2,041,128	2,120,390	2,109,648	2,186,140
CO-23	MH-2437	MH-2303	22.7	20.4	18	134	0.017	803,092	882,307	871,518	950,726	2,041,005	2,120,391	2,109,774	2,186,141
CO-24	MH-2531	MH-2437	24.38	22.7	18	94	0.018	803,095	882,306	871,518	950,727	2,040,839	2,120,392	2,109,945	2,186,141
CO-25	MH-2844	MH-2531	30	24.38	18	313	0.018	803,091	882,308	871,507	950,726	2,040,060	2,120,392	2,110,735	2,186,142
CO-26	MH-2950	MH-2844	31.93	30	18	106	0.018	803,151	882,307	871,457	950,726	2,042,394	2,120,391	2,113,504	2,186,142
CO-27	MH-3285	MH-2950	32.32	31.93	18	335.8	0.001	803,090	882,307	871,031	950,726	2,041,150	2,120,395	2,109,625	2,186,141
CO-28	MH-3600	MH-3285	33.07	32.57	15	314.3	0.002	765,747	793,557	833,706	861,506	2,016,284	2,044,117	2,084,227	2,109,372
CO-29	MH-3900	MH-3600	33.55	33.07	15	300	0.002	762,811	790,624	830,772	858,569	2,013,432	2,041,530	2,081,294	2,107,416
CO-30	MH-4045	MH-3900	33.78	33.55	15	145	0.002	762,811	790,625	830,768	858,570	2,013,368	2,042,577	2,081,295	2,107,419
CO-31	MH-4188	MH-4045	34.01	33.78	15	143	0.002	711,697	711,618	765,192	765,078	1,897,397	1,900,177	1,950,898	1,950,896
Corbin Drive															
CO-32	MH-050	MH-4045	34.11	34	12	50	0.002	49,903	76,581	67,258	93,842	101,997	119,238	110,565	129,107
CO-33	MH-226	MH-050	34.5	34.11	12	176	0.002	42,069	69,875	55,068	82,722	101,997	120,358	110,563	129,107
CO-34	MH-489	MH-226	35.07	34.5	12	263	0.002	42,099	69,888	54,842	82,721	103,690	131,505	116,539	142,661
CO-35	MH-691	MH-489	35.51	35.07	12	202	0.002	36,985	36,985	49,829	49,829	98,612	98,612	111,461	111,461
CO-36	MH-722	MH-691	35.58	35.51	12	31	0.002	37,143	37,143	50,087	50,087	98,612	98,613	111,533	111,533
8" Line to the West															
CO-40	MH-080	MH-00	6.05	5.32	8	80.8	0.009	20,797	20,797	25,518	25,518	29,274	27,597	34,433	34,433
CO-41	MH335	MH-080	20.7	6.05	8	255	0.057	21,107	21,107	25,786	25,786	28,489	27,576	32,404	32,405
8" Sewer to the South															
CO-3	MH-3	MH-040	7.82	5.27	8	128	0.02	42,898	42,898	43,376	43,376	112,580	113,365	112,794	112,794

surcharged line

8" main surcharged because of flow in 18" pipe